FORM PTO-1390 (REV 12-29-99)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: CA33-002

U.S. APPLICATION NO. (If known, see 37 CFR 1.5): 09/890135

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/US00/01952	26 January 2000	27 January 1999

TITLE OF INVENTION: ORAL HYGIENE PREPARATIONS: ASSOCIATED METHODS AND KIT

APPLICANT(S) FOR DO/EO/US: Victor Carnell

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [X] This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. [X] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [ ] is transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] has been transmitted by the International Bureau.
   c. [X] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [ ] A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. [X] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] have been transmitted by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [X] have not been made and will not be made.
8. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [X] A FIRST preliminary amendment. **PLEASE ENTER BEFORE CALCULATING THE FEES.**
    [ ] A SECOND or SUBSEQUENT preliminary amendment.
14. [ ] A substitute specification.
15. [ ] A change of power of attorney and/or address letter.
16. [X] Other items or information:

1. International Preliminary Examination Report;
2. Copy of the International Search Report;
3. Copy of Form PCT/IB/304; and
4. Copy of Form PCT/IB/308.

CLIENT QUALIFIES AS A SMALL ENTITY.

U.S. APPLICATION NO (if known, see 37 CFR 1.5) 09/890135	INTERNATIONAL APPLICATION NO PCT/US00/01952	ATTORNEY'S DOCKET NUMBER CA33-002

17. [X] The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO	$ 1000	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO	$ 860	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO	$ 710	
International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4)	$ 690	
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4)	$ 100	

ENTER APPROPRIATE BASIC FEE AMOUNT =				$	690.00
Surcharge of **$130.00** for furnishing the oath or declaration later than [ ] 20 [X] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				$	130.00
CLAIMS	NUMBER FILED		NUMBER EXTRA	RATE	
Total claims	13	- 20 =	0	X $18.00	$ 0
Independent claims	4	- 3 =	1	X $ 80	$ 80.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				+$270	$ 0
TOTAL OF ABOVE CALCULATIONS =				$	900.00
Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also by filed (Note 37 CFR 1.9, 1.27, 1.28).				$	450.00
SUBTOTAL =				$	
Processing fee of **$130.00** for furnishing the English translation later than [ ]20 [ ]30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$	–
TOTAL NATIONAL FEE =				$	450.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$	–
TOTAL FEES ENCLOSED =				$	450.00
				Amount to be: refunded	$
				charged	$

a. [X] A check in the amount of $ 450.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 14-0930. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Kevin S. Lemack
Nields & Lemack
176 E. Main Street - Suite 8
Westboro, MA 01581

SIGNATURE:

Kevin S. Lemack
NAME

32,579
REGISTRATION NUMBER

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Carnell, Victor
Serial No.	:	Not yet assigned (PCT/US00/01952)
Filed	:	Herewith By Express Mail
For	:	ORAL HYGIENE PREPARATIONS; ASSOCIATED METHODS AND KIT
Examiner	:	Not yet assigned
Art Unit	:	Not yet assigned
Attorney Docket No.	:	CA33-002

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

PRELIMINARY AMENDMENT

Please amend the specification and claims as shown on the attached Version With Markings to Show Changes Made and Replacement Sheets. The amendment corrects obvious errors in the specification and claims.

Claims 1-6 and 15-16, 18 amd 22-23 are amended.

Claims 7-12 and 17 and 19-21 are cancelled.

Claim 14 remains unchanged.

Respectfully submitted,

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Version With Markings to Show Changes Made

Page 1, 7-14:

This invention relates generally to hygiene preparations, particularly for oral care, but also for other applications in the treatment of hair or skin. The invention pertains to compositions that 1) inhibit the development of caries and 2) are less toxic or irritant to oral tissues in human patients including [immunocomprimised] immunocompromised and chemotherapy treated patients. In addition, the invention pertains to an oral hygiene kit, which includes a toothpaste, a mouthwash, and disinfectant solution, which in combination, reduces the incidence of caries by the bacterial flora that [contributes] contribute to the development of this and other disorders.

Page 2, lines 12-16:

While the prior art compositions, and other methods have operated with varying degrees of success in controlling the onset of caries, these same methods and compositions have not been particularly useful in arresting oral and other systemic diseases which are caused by bacteria and fungi which may be introduced by way of, or are resident in, the [patent's] patient's oral cavity.

Page 2, lines 21-26:

Adults receiving radiation of the head and neck for oncological therapy present a unique situation with damage to the mucosal, and skeletal tissues, in addition to the frequently seen radiation caries of the [dentition] dentin. Of equal importance is the concern of orthodontists regarding the decalcification of tooth enamel during orthodontic treatment, which is so prevalent today. Seniors are experiencing rampant root surface decay to the extent it is now nearly epidemic.

Page 3, line 15 to page 4, line 9:

The invention pertains to compositions that:

1) inhibit the development of caries and

2) are less toxic or irritant to oral tissues in human patients including [immunocomprimised] immunocompromised and chemotherapy treated patients.

These compositions are comprised of varying concentrations of [Cetyl Pyridinium] Cetylpyridinium Chloride (CPC) and dehydroacetic acid (DHA). In addition, the invention pertains to an oral hygiene kit that includes a toothpaste, mouthwash, and disinfectant solution, which in combination, reduces the incidence of caries by reducing the bacterial flora that contributes to the development of this and other disorders. The invention also pertains to compositions that are useful for the care of hair (e.g., shampoos) and skin (e.g., soap and gels, lotions and creams).

Page 4, lines 23 to page 5, line 4:

In accordance with one aspect of the present invention, an oral hygiene method is disclosed which reduces the incidence of caries and is less toxic and irritant to oral tissues in a patient and which includes[,]; contacting the patient's teeth and surrounding oral cavity with a toothpaste and mouthwash composition comprising a therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride; and exposing the patient's dental appliances and toothbrush periodically to a disinfecting solution comprising a therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride.

Page 5, lines 5-10:

Still further, another aspect of the present invention is to provide an oral hygiene kit which

includes[,]: a toothpaste for use in combination with a toothbrush; a mouthwash; and a disinfecting solution to disinfect the toothbrush, and wherein the toothpaste, mouthwash and disinfecting solution each comprise a therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride and Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate to reduce the incidence of caries in a patient.

Page 5, lines 11-18:

Yet still another aspect of the present invention relates to an oral hygiene kit that comprises a toothpaste comprising less than about 0.37%, by weight, of [Cetyl Pyridinium] Cetylpyridinium Chloride and less than about 2.6%, by weight, of Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate; a mouthwash comprising less than about 0.4%, by weight, of [Cetyl Pyridinium] Cetylpyridinium Chloride and less than about 0.4%, by weight, of Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate; and a disinfecting solution comprising less than about 0.075% by weight, of [Cetyl Pyridinium] Cetylpyridinium Chloride and less than about 2.1%, by weight, of Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate.

Page 5, line 19 to Page 6, line 6:

More specifically, the oral hygiene preparations and kit utilizing same includes a toothpaste that consists essentially of: about 1.6% to about 2.6% by weight of Sodium [Lauryl Sarcosine:] Lauroyl Sarcosinate;

about 0.25% to about 0.30% by weight of Sodium Fluoride;

about 0.1% to about 0.6% by weight of Dehydroacetic Acid;

about 0.18% to about 0.37% by weight of [Cetyl Pyridinium] Cetylpyridinium Chloride;

about 30% to about 60% by weight of Sorbitol;

about 3% to about 10% by weight of [Glycerine] Glycerin;

about 1% to about 3% by weight of Cellulose Gum;

about 0.3% to about 1.0% by weight of Titanium Dioxide;

about 0.08% to about 0.1% by weight of Flavors;

about 10% to about 30% by weight of Hydrated Silica; and

about 10% to about 30% by weight of water.

Page 6, lines 7-24:

In addition to the foregoing, the oral hygiene preparations and the kit utilizing same includes a mouthwash which consists essentially of:

about 0.15% to about 0.4%, by weight, of Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate;

about 0.25% to about 0.30%, by weight of Sodium Fluoride;

about 0.01% to about 0.06%, by weight of Dehydroacetic Acid;

about 0.05% to about 0.10%, by weight of [Cetyl Pyridinium] Cetylpyridinium Chloride;

about 5% to about 10% by weight of Sorbitol;

about 10% to about 20% by weight of [Glycerine] Glycerin;

about 0.01% to about 0.1%, by weight, of Menthol;

about 0.01% to about 0.1%, by weight, of citric acid;

about 0.01% to about 1.0%, by weight, of a Polysorbate;

about 0.008% to about 0.1% by weight of Potassium Tribasic Phosphate;

about 0.01% to about 0.10%, by weight, of Potassium Benzoate;

about 0.1% to about 0.7%, by weight, of Peppermint oils; and

about 70% to about 80%, by weight, of water.

Page 7, lines 1-14:

Yet, still further, the oral hygiene preparations and kit utilizing same includes a disinfecting solution which consists essentially of:

about 0.06% to about 0.75% by weight of [Cetyl Pyridinium] Cetylpyridinium Chloride;

about 1% to about 2% by weight of Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate;

about 0.01% to about 2% by weight of Sodium Carbonate;

about 14% to about 35% by weight of ethanol;

about 0.01% to about 0.075% by weight of EDTA; and

about 65% to about 87% by weight of water.

The preferred embodiment of the present invention for toothpaste is comprised of about 1.7% by weight of Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate; about 0.25% by weight of Sodium Fluoride; about 0.2% by weight of [Dehyroacetic] Dehydroacetic Acid; about 0.30% by weight [Glycerine] Glycerin, at a pH of 6.2 (hereafter referred to as TP-1).

Page 7, lines 15-18:

The preferred embodiment of the present invention for mouthwash is comprised of about 0.2% by weight of Sodium [Lauryl Sarcosine:] Lauroyl Sarcosinate; about 0.25% by weight of Sodium Fluoride; about 0.1% by weight of [Dehyroacetic] Dehydroacetic Acid; about 0.05% by weight of [Cetyl Pyridium] Cetylpyridinium Chloride; at a pH of 6.2 (hereafter referred to as MW-1).

Page 9, lines 9-22:

In this experiment, 100-150 milligrams of toothpaste (TP-1) was placed in sterile distilled water and subsequently vortexed to provide a suspension. This suspension was later transferred to

a sterile cup. A tooth was submerged in the toothpaste suspension for three minutes. Thereafter, the tooth was thoroughly rinsed with distilled water and the excess water was removed from the tooth. The tooth was then transferred to a sterile cup which contained the aforementioned mouthwash solution. The tooth was submerged in the mouthwash solution for one minute, and then later removed and excess mouthwash was removed from same. The tooth was then placed on a blood agar plate that had been inoculated with a lawn of S. mutans, and Candida albicans (1.5 x [108] $\underline{10^8}$ CFU/ml). The blood agar plate was then incubated for a period of 24 hours at a temperature of 35 degrees C, and the plate was observed for the inhibition of bacterial growth around the tooth. This zone of inhibition, in millimeters was then measured, and the results recorded.

Page 9, line 25 to page 10, line 12:

In this experiment, 100-150 milligrams of toothpaste (TP-1) was placed in sterile distilled water and a vortexed was applied to same to create a suspension. This suspension was transferred to a sterile cup. A tooth was later placed in the toothpaste suspension for three minutes. The tooth was removed and sterile water was applied to the same. Excess water was removed from the tooth. The tooth was then transferred to the cup and the tooth subsequently submerged in the mouthwash (MW-1) [a sterile] solution for one minute. The tooth was then removed and rinsed thoroughly with sterile distilled water. The tooth was then placed on a blood agar plate that had been inoculated with a lawn of Candida (1.5,x [108] $\underline{10^8}$ CFU/ml). This plate was then incubated at 35 degrees C. for 24 hours. The plate was subsequently observed for the inhibition of bacterial growth around the tooth. The estimated zone of inhibition was then measured, in millimeters, and the results recorded.

Page 10, line 24 to page 11, line 21:

In this example, the efficacy of the disinfecting solution was explored. [In this example, inoculums] Inoculums (1.5 x [108] 10^8 CFU/ml (Test A) and 1.5 x [104CFU/ml] 10^4 CFU/ml (Test B) of S. mutans ATCC 35668; S. aureus ATCC 25923; and C. albicans were prepared and vortexed. Each inoculum was poured into separate sterile cups. Thereafter, a patient's toothbrush was placed in each of the inoculums and completely submerged for 10 seconds. Following instructions, the toothbrushes [are] were removed from the inoculums and excess inoculum [is] was removed from each of the brushes. Thereafter, the respective brushes [are] were submerged in the disinfecting solution earlier described, and a timing sequence [is] was initiated. Thereafter, the brushes [are] were removed at 5 [minutes, 10 minutes, 30 minutes] minute, 10 minute, 30 minute and 60 minutes intervals. Each of these brushes [is] were then placed in a 10 millimeter nutrient broth, when testing, for the S. aureus and C. albicans; and 10 millimeters of Todd Hewitt broth, when testing, for the organism S. mutans. The tubes of nutrient, and Todd Hewitt broth and brushes [are] were then vortexed and .01 millimeters of inoculant [is] was removed from the respective suspension and inoculated onto separate blood agar plates. A loop [is] was used to streak the individual blood agar plates for isolation. The blood agar plates [are] were incubated for periods of 24, 48 and 72 hours and subsequent records [are] were made of the colony counts at each of these points in time. It should be understood that the S. mutans plate [is[was incubated in a carbon dioxide environment, and the S> aureus and C. albicans plates [are] were incubated in an oxygen environment. The contaminated brushes [are] were then placed in a 100% denatured ethanol bath after each use for 10 minutes. The brushes [are] were allowed to air dry prior to each use. This procedure [is] was repeated very day for seven days.

Page 13, lines 1-2:

Results

TEST A

Page 14, line 16:

TEST B

Page 16, line 21 to Page 17, line 5:

Three mouthwash test preparations were evaluated for antimicrobial properties against Candida albicans and Streptococcus mutans. Cell suspensions of each organism were exposed to three mouthwash preparations, separately, over multiple [timepoints;plated] timepoints; plated on blood agar (BAP); incubated at [35degrees C.] 35°C; and colony counts recorded at 24 and 48 hours respectively. The mouthwash test preparations contain [cetyl pyridium] cetylpyridinium chloride (CPC), without [flavorina] flavoring components, at a 1X strength made from a 50X [cetyl pyridium] cetylpyridinium chloride stock (CPC); A1 blue, and A2 green were provided at the working concentration. 50 [μL] μl of CPC, A1 blue, and A2 green were plated separately, as controls, to detect possible contamination of the respective mouthwash preparations. McFarland cell suspensions of C. albicans and S. mutans (ATCC 35668) were made in tryptone yeast extract broth (Sensibroth) yielding, approximate cell densities of 1.5×10^8 [cells/mL.] cells/ml. 50 [μL] μl of each organism were plated as a growth control.

Page 18, lines 3-7:

No growth was seen on plates [inocuated] inoculated with [green-treatedS.] green-treated S.

mutans after 24 hours of incubation, however, at 48 hours, greater than 100 colonies were present at all timepoints (Table 4). As with the A1 blue experiment, A2 green did not achieve total killing of C. albicans even after 10 minutes but growth inhibition was apparent by 3 to 4 fold (Table 4).

Page 18, lines 24-26:

1. [50μL] 50 μl of each pre-inoculation test was plated.

2. Approximately 7.5 x 10^6 [CFUs] CFU/ml of C. albicans and S. mutans were plated as growth controls.

Page 19, lines 13-17:

1. approximately 7.5 x 10^4 [CFUs] CFU/ml of C. albicans in CPC plated on BAP at timepoints indicated.

2. Approximately 7.5 x 10^4 [CFUs] CFU/ml of S. mutans in CPC plated on BAP at timepoints indicated.

Page 20, lines 6-10:

1. Approximately 7.5 x 10^4 [CFUs] CFU/ml of C. albicans in A1 blue plated on BAP at timepoints indicated.

2. Approximately 7.5 x 10^4 [CFUs] CFU/ml of S. mutans in A1 blue plated on BAP at timepoints indicated.

Page 20, line 24 to Page 21, line 1:

1. Approximately 7.5 x 10^4 [CFUs] CFU/ml of C. albicans in A2 green plated on BAP at

timepoints indicated.

2. Approximately 7.5 x 10^4 [CFUs] CFU/ml of S. mutans in A2 green plated on BAP at timepoints indicated.

Page 21, lines 19-24:

1.2 Summary of Test Method

Red blood cells are isolated concentrations of the test materials defined from results of a range finding; released hemoglobin [haemoglobin] is measured at 541 [run] nm and the concentration resulting in 50% [haemolysis] hemolysis relative to a totally lysed sample) calculated.

Page 22, lines 10-15:

(b) After the final centrifugation, the packed cell volume is diluted with phosphate buffered saline (PBS) [- Appendix 2] to give an approximate 2% erythrocyte suspension. However, for a packed volume of e.g. 2ml, where the required volume of PBS added would be 98 ml, add 80 ml at this stage. The exact volume of PBS required for a 2% suspension is calculated from the optical density and adjusted accordingly.

Page 22, lines 16-24:

(c) To determine the optical density, a 1 ml sample of the erythrocyte suspension (prepared above) is diluted to 10 ml in distilled or deionised water (when using distilled water the pH should be in the range of 6.5-7.5). The desired optical density (OD) of the lysate is equivalent to 0.5 ($\pm$5%) at 541 [run] nm in 1 cm path length cells. Distilled or deionised water is used as the blank sample. The desired volume of PBS required for the correct concentration of erythrocytes in suspension to

give the normal desired extinction of 0.5 (±5%) is calculated using the following equation:

Page 26, line 1:

The following results were demonstrated with the above described [aassy] assay:

Page 26, lines 20-25:

Individual Components:

Test Materials	% [Haemolysis] Hemolysis
Phosphate Buffered Saline	0.00
0.25% [25%] Sodium Fluoride	3.31
0.05% CPC	92.36
0.10% DHA	3.24

In the claims

1. (Amended) An oral hygiene method for reducing the incidence of caries in a patient, comprising: contacting the patient's teeth, and surrounding oral cavity, with a toothpaste[,] and mouthwash compositions comprising a therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride; and exposing the patient's dental appliances and toothbrush periodically to a disinfecting solution comprising a therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride.

2. (Amended) An oral hygiene method as claimed in claim 1, wherein the therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride in the toothpaste is less than about 0.37% by weight of the resulting toothpaste composition.

3. (Amended) An oral hygiene method as claimed in claim 2, wherein the therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride in the mouthwash is less than about 0.40% by weight of the resulting mouthwash composition.

4. (Amended) An oral hygiene method as claimed in claim 3, wherein the therapeutically effective amount of the [Cetyl Pyridinium] Cetylpyridinium Chloride in the disinfecting solution is less than about [0.075%] 0.75% by [weicyht] weight, of the resulting disinfecting solution.

5. (Amended) An oral hygiene method as claimed in claim 1, wherein the toothpaste, mouthwash and disinfecting solution further comprises a therapeutically effective amount of Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate.

6. (Amended) An oral hygiene method as claimed in claim 5, wherein the therapeutically effective amount of Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate in the toothpaste is less than about 2.6%, by weight, of the resulting toothpaste[-] composition.

7. (cancelled)

8. (cancelled)

9. (cancelled)

10. (cancelled)

11. (cancelled)

12. (unchanged)

13. (Amended) An oral hygiene method as claimed in claim 1, wherein the therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride in the toothpaste, mouthwash and disinfecting solution effectively reduces the number of bacterial flora which contribute to the development of caries.

14. (unchanged)

15. (Amended) An oral hygiene kit, comprising:

a toothpaste for use in combination with a [tooth brush] toothbrush; a mouthwash; and a disinfecting solution to disinfect the toothbrush, and wherein the toothpaste, mouthwash and disinfecting solution each comprise a therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride and Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate to reduce the incidence of caries in a patient.

16. (Amended) An oral hygiene kit as claimed in claim 15, wherein the therapeutically effective amount of [Cetyl Pyridinium] Cetylpyridinium Chloride and the Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate in the toothpaste, mouthwash and disinfecting solution effectively reduces the number of bacterial flora which contribute to the development of caries.

17. (cancelled)

18. (Amended) An oral hygiene kit as claimed in claim 15, wehrein the toothpaste comprises:

about 1.6% to about 2.6%, by weight, of Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate;

about 0.25% to about 0.30%, by weight of Sodium Fluoride;

about 0.1% to about 0.6%, by weight, of Dehydroacetic Acid;

about 0.18% to about 0.37%, by weight, of [Cetyl Pyridinium] Cetylpyridinium Chloride;

about 30% to about 60%, by weight, of Sorbitol;

about 3% to about 10%, by weight, of [Glycerine] Glycerin;

about 1% to about 3%, by weight, of Cellulose Gum;

about 0.3% to about 1.0%, by weight, of Titanium Dioxide;

about 0.08% to about 0.1%, by weight, of Flavors;

about 10% to about 30%, by weight, of Hydrated Silica; and

about 10% to about 30%, by weight, of water.

19. (cancelled)

20. (cancelled)

21. (cancelled)

22. (Amended) A toothpaste comprising [comprised of about 1.7% by weight of] Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate; [about 0.25% by weight of] Sodium Fluoride; [about 0.2% by weight of Dehyroacetic] Dehydroacetic Acid; Cetylpyridinium Chloride, and [about 0.30% by Glycerine] Glycerin, at a pH of 6.2.

23. (Amended) A mouthwash comprising [comprised of about 0.2% by weight of] Sodium [Lauryl Sarcosine] Lauroyl Sarcosinate; [about 0.25% by weight of] Sodium Fluoride; [about 0.1% by weight of Dyhydroacetic] Dehydroacetic Acid; [about 0.05% by weight of Cetyl Pyridium] and Cetylpyridinium Chloride[;], at a pH of 6.2.

Replacement Sheets

Page 1, 7-14:

This invention relates generally to hygiene preparations, particularly for oral care, but also for other applications in the treatment of hair or skin. The invention pertains to compositions that 1) inhibit the development of caries and 2) are less toxic or irritant to oral tissues in human patients including immunocompromised and chemotherapy treated patients. In addition, the invention pertains to an oral hygiene kit, which includes a toothpaste, a mouthwash, and disinfectant solution, which in combination, reduces the incidence of caries by the bacterial flora that contribute to the development of this and other disorders.

Page 2, lines 12-16:

While the prior art compositions, and other methods have operated with varying degrees of success in controlling the onset of caries, these same methods and compositions have not been particularly useful in arresting oral and other systemic diseases which are caused by bacteria and fungi which may be introduced by way of, or are resident in, the patient's oral cavity.

Page 2, lines 21-26:

Adults receiving radiation of the head and neck for oncological therapy present a unique situation with damage to the mucosal, and skeletal tissues, in addition to the frequently seen radiation caries of the dentin. Of equal importance is the concern of orthodontists regarding the decalcification of tooth enamel during orthodontic treatment, which is so prevalent today. Seniors are experiencing rampant root surface decay to the extent it is now nearly epidemic.

Page 3, line 15 to page 4, line 9:

The invention pertains to compositions that:

1) inhibit the development of caries and

2) are less toxic or irritant to oral tissues in human patients including immunocompromised and chemotherapy treated patients.

These compositions are comprised of varying concentrations of Cetylpyridinium Chloride (CPC) and dehydroacetic acid (DHA). In addition, the invention pertains to an oral hygiene kit that includes a toothpaste, mouthwash, and disinfectant solution, which in combination, reduces the incidence of caries by reducing the bacterial flora that contributes to the development of this and other disorders. The invention also pertains to compositions that are useful for the care of hair (e.g., shampoos) and skin (e.g., soap and gels, lotions and creams).

Page 4, lines 23 to page 5, line 4:

In accordance with one aspect of the present invention, an oral hygiene method is disclosed which reduces the incidence of caries and is less toxic and irritant to oral tissues in a patient and which includes; contacting the patient's teeth and surrounding oral cavity with a toothpaste and mouthwash composition comprising a therapeutically effective amount of Cetylpyridinium Chloride; and exposing the patient's dental appliances and toothbrush periodically to a disinfecting solution comprising a therapeutically effective amount of Cetylpyridinium Chloride.

Page 5, lines 5-10:

Still further, another aspect of the present invention is to provide an oral hygiene kit which includes: a toothpaste for use in combination with a toothbrush; a mouthwash; and a disinfecting

solution to disinfect the toothbrush, and wherein the toothpaste, mouthwash and disinfecting solution each comprise a therapeutically effective amount of Cetylpyridinium Chloride and Sodium Lauroyl Sarcosinate to reduce the incidence of caries in a patient.

Page 5, lines 11-18:

Yet still another aspect of the present invention relates to an oral hygiene kit that comprises a toothpaste comprising less than about 0.37%, by weight, of Cetylpyridinium Chloride and less than about 2.6%, by weight, of Sodium Lauroyl Sarcosinate; a mouthwash comprising less than about 0.4%, by weight, of Cetylpyridinium Chloride and less than about 0.4%, by weight, of Sodium Lauroyl Sarcosinate; and a disinfecting solution comprising less than about 0.075% by weight, of Cetylpyridinium Chloride and less than about 2.1%, by weight, of Sodium Lauroyl Sarcosinate.

Page 5, line 19 to Page 6, line 6:

More specifically, the oral hygiene preparations and kit utilizing same includes a toothpaste that consists essentially of: about 1.6% to about 2.6% by weight of Sodium Lauroyl Sarcosinate;

about 0.25% to about 0.30% by weight of Sodium Fluoride;

about 0.1% to about 0.6% by weight of Dehydroacetic Acid;

about 0.18% to about 0.37% by weight of Cetylpyridinium Chloride;

about 30% to about 60% by weight of Sorbitol;

about 3% to about 10% by weight of Glycerin;

about 1% to about 3% by weight of Cellulose Gum;

about 0.3% to about 1.0% by weight of Titanium Dioxide;

about 0.08% to about 0.1% by weight of Flavors;

about 10% to about 30% by weight of Hydrated Silica; and

about 10% to about 30% by weight of water.

Page 6, lines 7-24:

In addition to the foregoing, the oral hygiene preparations and the kit utilizing same includes a mouthwash which consists essentially of:

about 0.15% to about 0.4%, by weight, of Sodium Lauroyl Sarcosinate;

about 0.25% to about 0.30%, by weight of Sodium Fluoride;

about 0.01% to about 0.06%, by weight of Dehydroacetic Acid;

about 0.05% to about 0.10%, by weight of Cetylpyridinium Chloride;

about 5% to about 10% by weight of Sorbitol;

about 10% to about 20% by weight of Glycerin;

about 0.01% to about 0.1%, by weight, of Menthol;

about 0.01% to about 0.1%, by weight, of citric acid;

about 0.01% to about 1.0%, by weight, of a Polysorbate;

about 0.008% to about 0.1% by weight of Potassium Tribasic Phosphate;

about 0.01% to about 0.10%, by weight, of Potassium Benzoate;

about 0.1% to about 0.7%, by weight, of Peppermint oils; and

about 70% to about 80%, by weight, of water.

Page 7, lines 1-14:

Yet, still further, the oral hygiene preparations and kit utilizing same includes a disinfecting solution which consists essentially of:

about 0.06% to about 0.75% by weight of Cetylpyridinium Chloride;

about 1% to about 2% by weight of Sodium Lauroyl Sarcosinate;

about 0.01% to about 2% by weight of Sodium Carbonate;

about 14% to about 35% by weight of ethanol;

about 0.01% to about 0.075% by weight of EDTA; and

about 65% to about 87% by weight of water.

The preferred embodiment of the present invention for toothpaste is comprised of about 1.7% by weight of Sodium Lauroyl Sarcosinate; about 0.25% by weight of Sodium Fluoride; about 0.2% by weight of Dehydroacetic Acid; about 0.30% by weight Glycerin, at a pH of 6.2 (hereafter referred to as TP-1).

Page 7, lines 15-18:

The preferred embodiment of the present invention for mouthwash is comprised of about 0.2% by weight of Sodium Lauroyl Sarcosinate; about 0.25% by weight of Sodium Fluoride; about 0.1% by weight of Dehydroacetic Acid; about 0.05% by weight of Cetylpyridinium Chloride; at a pH of 6.2 (hereafter referred to as MW-1).

Page 9, lines 9-22:

In this experiment, 100-150 milligrams of toothpaste (TP-1) was placed in sterile distilled water and subsequently vortexed to provide a suspension. This suspension was later transferred to a sterile cup. A tooth was submerged in the toothpaste suspension for three minutes. Thereafter, the tooth was thoroughly rinsed with distilled water and the excess water was removed from the tooth.

The tooth was then transferred to a sterile cup which contained the aforementioned mouthwash solution. The tooth was submerged in the mouthwash solution for one minute, and then later removed and excess mouthwash was removed from same. The tooth was then placed on a blood agar plate that had been inoculated with a lawn of S. mutans, and Candida albicans (1.5×10^8 CFU/ml). The blood agar plate was then incubated for a period of 24 hours at a temperature of 35 degrees C, and the plate was observed for the inhibition of bacterial growth around the tooth. This zone of inhibition, in millimeters was then measured, and the results recorded.

Page 9, line 25 to page 10, line 12:

In this experiment, 100-150 milligrams of toothpaste (TP-1) was placed in sterile distilled water and a vortexed was applied to same to create a suspension. This suspension was transferred to a sterile cup. A tooth was later placed in the toothpaste suspension for three minutes. The tooth was removed and sterile water was applied to the same. Excess water was removed from the tooth. The tooth was then transferred to the cup and the tooth subsequently submerged in the mouthwash (MW-1) [a sterile] solution for one minute. The tooth was then removed and rinsed thoroughly with sterile distilled water. The tooth was then placed on a blood agar plate that had been inoculated with a lawn of Candida (1.5×10^8 CFU/ml). This plate was then incubated at 35 degrees C. for 24 hours. The plate was subsequently observed for the inhibition of bacterial growth around the tooth. The estimated zone of inhibition was then measured, in millimeters, and the results recorded.

Page 10, line 24 to page 11, line 21:

In this example, the efficacy of the disinfecting solution was explored. Inoculums (1.5×10^8 CFU/ml (Test A) and 1.5×10^4 CFU/ml (Test B) of S. mutans ATCC 35668; S. aureus ATCC

25923; and C. albicans were prepared and vortexed. Each inoculum was poured into separate sterile cups. Thereafter, a patient's toothbrush was placed in each of the inoculums and completely submerged for 10 seconds. Following instructions, the toothbrushes were removed from the inoculums and excess inoculum was removed from each of the brushes. Thereafter, the respective brushes were submerged in the disinfecting solution earlier described, and a timing sequence was initiated. Thereafter, the brushes were removed at 5 minutes, 30 minute, 10 minute, 30 minute and 60 minutes intervals. Each of these brushes were then placed in a 10 millimeter nutrient broth, when testing, for the S. aureus and C. albicans; and 10 millimeters of Todd Hewitt broth, when testing, for the organism S. mutans. The tubes of nutrient, and Todd Hewitt broth and brushes were then vortexed and .01 millimeters of inoculant was removed from the respective suspension and inoculated onto separate blood agar plates. A loop was used to streak the individual blood agar plates for isolation. The blood agar plates were incubated for periods of 24, 48 and 72 hours and subsequent records were made of the colony counts at each of these points in time. It should be understood that the S. mutans plate was incubated in a carbon dioxide environment, and the S. aureus and C. albicans plates were incubated in an oxygen environment. The contaminated brushes were then placed in a 100% denatured ethanol bath after each use for 10 minutes. The brushes were allowed to air dry prior to each use. This procedure was repeated very day for seven days.

Page 13, lines 1-2:

Results

TEST A

Page 14, line 16:

TEST B

Page 16, line 21 to Page 17, line 5:

Three mouthwash test preparations were evaluated for antimicrobial properties against Candida albicans and Streptococcus mutans. Cell suspensions of each organism were exposed to three mouthwash preparations, separately, over multiple timepoints; plated on blood agar (BAP); incubated at 35°C; and colony counts recorded at 24 and 48 hours respectively. The mouthwash test preparations contain cetylpyridinium chloride (CPC), without flavoring components, at a 1X strength made from a 50X cetylpyridinium chloride stock (CPC); A1 blue, and A2 green were provided at the working concentration. 50 μl of CPC, A1 blue, and A2 green were plated separately, as controls, to detect possible contamination of the respective mouthwash preparations. McFarland cell suspensions of C. albicans and S. mutans (ATCC 35668) were made in tryptone yeast extract broth (Sensibroth) yielding, approximate cell densities of 1.5 x 10^8 cells/ml. 50 μl of each organism were plated as a growth control.

Page 18, lines 3-7:

No growth was seen on plates inoculated with green-treated S. mutans after 24 hours of incubation, however, at 48 hours, greater than 100 colonies were present at all timepoints (Table 4). As with the A1 blue experiment, A2 green did not achieve total killing of C. albicans even after 10 minutes but growth inhibition was apparent by 3 to 4 fold (Table 4).

Page 18, lines 24-26:

1. 50 μl of each pre-inoculation test was plated.

2. Approximately 7.5 x 10^6 CFU/ml of C. albicans and S. mutans were plated as growth controls.

Page 19, lines 13-17:

1. approximately 7.5 x 10^4 CFU/ml of C. albicans in CPC plated on BAP at timepoints indicated.

2. Approximately 7.5 x 10^4 CFU/ml of S. mutans in CPC plated on BAP at timepoints indicated.

Page 20, lines 6-10:

1. Approximately 7.5 x 10^4 CFU/ml of C. albicans in A1 blue plated on BAP at timepoints indicated.

2. Approximately 7.5 x 10^4 CFU/ml of S. mutans in A1 blue plated on BAP at timepoints indicated.

Page 20, line 24 to Page 21, line 1:

1. Approximately 7.5 x 10^4 CFU/ml of C. albicans in A2 green plated on BAP at timepoints indicated.

2. Approximately 7.5 x 10^4 CFU/ml of S. mutans in A2 green plated on BAP at timepoints indicated.

Page 21, lines 19-24:

1.2 Summary of Test Method

Red blood cells are isolated concentrations of the test materials defined from results of a range finding; released hemoglobin is measured at 541 nm and the concentration resulting in 50% hemolysis relative to a totally lysed sample) calculated.

Page 22, lines 10-15:

(b) After the final centrifugation, the packed cell volume is diluted with phosphate buffered saline (PBS) to give an approximate 2% erythrocyte suspension. However, for a packed volume of e.g. 2ml, where the required volume of PBS added would be 98 ml, add 80 ml at this stage. The exact volume of PBS required for a 2% suspension is calculated from the optical density and adjusted accordingly.

Page 22, lines 16-24:

(c) To determine the optical density, a 1 ml sample of the erythrocyte suspension (prepared above) is diluted to 10 ml in distilled or deionised water (when using distilled water the pH should be in the range of 6.5-7.5). The desired optical density (OD) of the lysate is equivalent to 0.5 (±5%) at 541 nm in 1 cm path length cells. Distilled or deionised water is used as the blank sample. The desired volume of PBS required for the correct concentration of erythrocytes in suspension to give the normal desired extinction of 0.5 (±5%) is calculated using the following equation:

Page 26, line 1:

The following results were demonstrated with the above described assay:

Page 26, lines 20-25:

Individual Components:

Test Materials	% Hemolysis
Phosphate Buffered Saline	0.00
0.25% Sodium Fluoride	3.31
0.05% CPC	92.36
0.10% DHA	3.24

In the claims:

1. (Amended) An oral hygiene method for reducing the incidence of caries in a patient, comprising: contacting the patient's teeth, and surrounding oral cavity, with a toothpaste and mouthwash compositions comprising a therapeutically effective amount of Cetylpyridinium Chloride; and exposing the patient's dental appliances and toothbrush periodically to a disinfecting solution comprising a therapeutically effective amount of Cetylpyridinium Chloride.

2. (Amended) An oral hygiene method as claimed in claim 1, wherein the therapeutically effective amount of Cetylpyridinium Chloride in the toothpaste is less than about 0.37% by weight of the resulting toothpaste composition.

3. (Amended) An oral hygiene method as claimed in claim 2, wherein the therapeutically effective amount of Cetylpyridinium Chloride in the mouthwash is less than about 0.40% by weight of the resulting mouthwash composition.

4. (Amended) An oral hygiene method as claimed in claim 3, wherein the therapeutically effective amount of the Cetylpyridinium Chloride in the disinfecting solution is less than about 0.75% by weight, of the resulting disinfecting solution.

5. (Amended) An oral hygiene method as claimed in claim 1, wherein the toothpaste, mouthwash and disinfecting solution further comprises a therapeutically effective amount of Sodium Lauroyl Sarcosinate.

6. (Amended) An oral hygiene method as claimed in claim 5, wherein the therapeutically effective amount of Sodium Lauroyl Sarcosinate in the toothpaste is less than about 2.6%, by weight, of the resulting toothpaste composition.

7. (cancelled)

8. (cancelled)

9. (cancelled)

10. (cancelled)

11. (cancelled)

12. (unchanged)

13. (Amended) An oral hygiene method as claimed in claim 1, wherein the therapeutically effective amount of Cetylpyridinium Chloride in the toothpaste, mouthwash and disinfecting solution effectively reduces the number of bacterial flora which contribute to the development of caries.

14. (unchanged)

15. (Amended) An oral hygiene kit, comprising:

a toothpaste for use in combination with a toothbrush; a mouthwash; and a disinfecting solution to disinfect the toothbrush, and wherein the toothpaste, mouthwash and disinfecting solution each comprise a therapeutically effective amount of Cetylpyridinium Chloride and Sodium Lauroyl Sarcosinate to reduce the incidence of caries in a patient.

16. (Amended) An oral hygiene kit as claimed in claim 15, wherein the therapeutically effective amount of Cetylpyridinium Chloride and the Sodium Lauroyl Sarcosinate in the toothpaste, mouthwash and disinfecting solution effectively reduces the number of bacterial flora which contribute to the development of caries.

17. (cancelled)

18. (Amended) An oral hygiene kit as claimed in claim 15, wehrein the toothpaste comprises:

about 1.6% to about 2.6%, by weight, of Sodium Lauroyl Sarcosinate;

about 0.25% to about 0.30%, by weight of Sodium Fluoride;

about 0.1% to about 0.6%, by weight, of Dehydroacetic Acid;

about 0.18% to about 0.37%, by weight, of Cetylpyridinium Chloride;

about 30% to about 60%, by weight, of Sorbitol;

about 3% to about 10%, by weight, of Glycerin;

about 1% to about 3%, by weight, of Cellulose Gum;

about 0.3% to about 1.0%, by weight, of Titanium Dioxide;

about 0.08% to about 0.1%, by weight, of Flavors;

about 10% to about 30%, by weight, of Hydrated Silica; and

about 10% to about 30%, by weight, of water.

19. (cancelled)

20. (cancelled)

21. (cancelled)

22. (Amended) A toothpaste comprising Sodium Lauroyl Sarcosinate; Sodium Fluoride; Dehydroacetic Acid; Cetylpyridinium Chloride, and Glycerin, at a pH of 6.2.

23. (Amended) A mouthwash comprising Sodium Lauroyl Sarcosinate; Sodium Fluoride; Dehydroacetic Acid; and Cetylpyridinium Chloride, at a pH of 6.2.

ORAL HYGIENE PREPARATIONS; ASSOCIATED METHODS AND KIT

TECHNICAL FIELD

This invention relates generally to hygiene preparations, particularly for oral care, but also for other applications in the treatment of hair or skin. The invention pertains to compositions that 1) inhibit the development caries and 2) are less toxic or irritant to oral tissues in human patients including immunocomprimised and chemotherapy treated patients. In addition, the invention pertains to an oral hygiene kit, which includes a toothpaste, mouthwash, and disinfectant solution, which in combination, reduces the incidence of caries by reducing the bacterial flora that contributes to the development of this and other disorders.

BACKGROUND ART

The removal of food/oral debris, the minimization of the microbial population in the mouth and throat, and the removal and prevention of plaque and calculus deposition are important for the enhancement of personal feelings of well-being (clean breath, mouth taste and mouth feel) and the prevention of oral diseases. Since the oral environment is conducive to microbial growth and subject to the reintroduction of food and microorganisms, and because plaque and calculus are continually being deposited on teeth, ideal oral hygiene methods and compositions must be

a) capable of good cleansing and microbial knockdowns,

b) able to remove plaque and calculus and prevent their formation, and

c) convenient and safe for repetitive use.

Traditional mouth washes and dentrifices suffer in all three areas.

The prior art is replete with numerous prior art references which are directed to various dentifrices, dentifricating paste, powders, and liquids which are employed for cleaning the teeth. As a general matter, these dentrifices contain a mixture of various ingredients including such materials as polishing agents and abrasives for scouring and scrubbing the teeth, and which are further operable, to some degree, to neutralize various acids present in the gaps between the teeth. These same substances further inhibit, to some extent, the subsequent growth of various forms of bacteria that contribute to the development of caries and other disorders.

While the prior art compositions, and other methods have operated with varying degrees of success in controlling the onset of caries, these same methods and compositions have not been particularly useful in arresting oral and other systemic diseases which are caused by bacteria and fungi which may be introduced by way of, or are resident in, the patent's oral cavity.

In addition to the above, it is known that because it is essential that the immuno-compromised patient maintain optimum weight, the frequent eating of high-calorie meals is encouraged. It is not advisable to restrict sugar and starches as it deprives the patient of essential calories.

Adults receiving radiation of the head and neck for oncological therapy present a unique situation with damage to the mucosal, and skeletal tissues, in addition to the frequently seen radiation caries of the dentition. Of equal importance is the concern of orthodontists regarding the decalcification of tooth enamel during orthodontic treatment, which is so prevalent today. Seniors are experiencing rampant root surface decay to the extent it is now nearly epidemic.

Today's regimen of brushing with current toothpaste's and rinses with high fluoride concentrations are not able to curb the acid production of carbohydrates that feed the dental plaque resulting in high decay rates and periodontal disease.

It is widely accepted, for example, that the best method for inhibiting caries is to refrain from foods containing high amounts of refined carbohydrates such as sucrose; fluoride treatment for developing teeth; and the subsequent mechanical removal of plaque by daily oral hygiene. On the other hand, there are no generally well accepted techniques, or preparations that are normally employed to inhibit many of the oral cavity disorders which are associated with many pathogenic bacterial, viral, and fungal agents. Additionally, many of the bacterial, viral and fungal pathogens produce, or encourage the production of a variety of enzymes which have been suspected as having a role in some periodontal maladies which have, as one of their many symptoms, tissue destruction; gingival inflammation; phagocytosis; bone resorption; and a variety of other deleterious conditions.

It has long been known, therefore, that it would be desirable to have an oral hygiene preparation and a method for use thereof which would address the many shortcomings identified with the prior art practices and compositions and which would further significantly reduce the bacterial flora which are responsible for encouraging the development of caries in patients as well as being less toxic and irritant to oral tissues; and which additionally reduces the incidence of other oral disorders which are associated with various bacterial, viral and fungal pathogens.

DISCLOSURE OF INVENTION

The invention pertains to compositions that

1) inhibit the development caries and

2) are less toxic or irritant to oral tissues in human patients including immunocomprimised and chemotherapy treated patients.

These compositions are comprised of varying concentrations of Cetyl Pyridinium Chloride (CPC) and dehydroacetic acid (DHA). In addition, the invention pertains to an oral hygiene kit that includes a toothpaste, mouthwash, and disinfectant solution, which in combination, reduces the incidence of caries by reducing the bacterial flora that contributes to the development of this and other disorders. The invention also pertains to compositions that are useful for the care of hair (e.g., shampoos) and skin (e.g., soap bars and gels, lotions and creams).

BRIEF DESCRIPTION OF DRAWINGS

Preferred embodiments of the invention are described below with reference to the following accompanying drawings.

Figure 1 is a plan view of an assembly that is utilized in connection with the present invention.

Figure 2 is a front elevation view of the assembly shown in Figure 1.

Figure 3 is a side elevation view of the assembly shown in Figure 1.

MODES FOR CARRYING OUT THE INVENTION

In accordance with one aspect of the present invention, an oral hygiene method is disclosed which reduces the incidence of caries and is less toxic and irritant to oral tissues in a patient and which includes, contacting the patient's teeth and surrounding oral cavity with a toothpaste and mouthwash composition

comprising a therapeutically effective amount of Cetyl Pyridinium Chloride; and exposing the patient's dental appliances and toothbrush periodically to a disinfecting solution comprising a therapeutically effective amount of Cetyl Pyridinium Chloride.

Still further, another aspect of the present invention is to provide an oral hygiene kit which includes, a toothpaste for use in combination with a toothbrush; a mouthwash; and a disinfecting solution to disinfect the toothbrush, and wherein the toothpaste, mouthwash and disinfecting solution each comprise a therapeutically effective amount Cetyl Pyridinium Chloride and Sodium Lauryl Sarcosine to reduce the incidence of caries in a patient.

Yet still another aspect of the present invention relates to an oral hygiene kit that comprises a toothpaste comprising less than about 0.37%, by weight, of Cetyl Pyridinium Chloride and less than about 2.6%, by weight, of Sodium Lauryl Sarcosine; a mouthwash comprising less than about 0.4%, by weight, of Cetyl Pyridinium Chloride and less than about 0.4%, by weight, of Sodium Lauryl Sarcosine; and a disinfecting solution comprising less than about 0.075%, by weight, of Cetyl Pyridinium Chloride, and less than about 2.1%, by weight, of Sodium Lauryl Sarcosine.

More specifically, the oral hygiene preparations and kit utilizing same includes a toothpaste that consists essentially of: about 1.6% to about 2.6% by weight of Sodium Lauryl Sarcosine;

about 0.25% to about 0.30% by weight of Sodium Fluoride;

about 0.1% to about 0.6% by weight of Dehydroacetic Acid;

about 0.18% to about 0.37% by weight of Cetyl Pyridinium Chloride;

about 30% to about 60% by weight of Sorbitol;

about 3% to about 10% by weight of Glycerine;

about 1% to about 3% by weight of Cellulose Gum;

about 0.3% to about 1.0% by weight of Titanium Dioxide;

about 0.08% to about 0.1% by weight of Flavors;

about 10% to about 30% by weight of Hydrated Silica; and

about 10% to about 30% by weight of water.

In addition to the foregoing, the oral hygiene preparations and the kit utilizing same includes a mouthwash which consists essentially of:

about 0.15% to about 0.4%, by weight, of Sodium Lauryl Sarcosine;

about 0.25% to about 0.30%, by weight of Sodium Fluoride;

about 0.01% to about 0.06%, by weight of Dehydroacetic Acid;

about 0.05% to about 0.10%, by weight of Cetyl Pyridinium Chloride

about 5% to about 10% by weight of Sorbitol;

about 10% to about 20% by weight of Glycerine;

about 0.01% to about 0.1%, by weight, of Menthol;

about 0.01% to about 0.1%, by weight, of citric acid;

about 0.10% to about 1.0% by weight of Polysorbate;

about .008% to about 0.1% by weight of Potassium Tribasic Phosphate;

about 0.01 to about 0.10%, by weight, of Potassium Benzoate;

about 0.1% to about 0.7%, by weight, of Peppermint oils; and

about 70% to about 80%, by weight, of water.

Yet, still further, the oral hygiene preparations and kit utilizing same includes a disinfecting solution which consists essentially of:

about 0.06% to about 0.75% by weight of Cetyl Pyridinium Chloride;

about 1% to about 2% by weight of Sodium Lauryl Sarcosine;

about 0.01% to about 2% by weight of Sodium Carbonate;

about 14% to about 35% by weight of ethanol;

about 0.01% to about 0.075% by weight of EDTA; and

about 65% to about 87% by weight of water.

The preferred embodiment of the present invention for toothpaste is comprised of about 1.7% by weight of Sodium Lauryl Sarcosine; about 0.25% by weight of Sodium Fluoride; about 0.2% by weight of Dehyroacetic Acid; about 0.30% by Glycerine, at a pH of 6.2 (hereafter referred to as TP-1).

The preferred embodiment of the present invention for mouthwash is comprised of about 0.2.% by weight of Sodium Lauryl Sarcosine: about 0.25% by weight of Sodium Fluoride; about 0.1% by weight of Dyhydroacetic Acid; about 0.05% by weight of Cetyl Pyridium Chloride; at pH 6.2 (hereafter referred to as MW-1).

An apparatus used in the implementation of the present oral hygiene preparations and associated kit is shown in Figure 1, 2 and 3, respectively. As shown therein, an assembly for holding both a toothbrush, and the aforementioned disinfecting solution is illustrated. The assembly 10 includes a base number 11 which includes a top surface 12 and an opposed bottom surface 13. Made integral with the bottom

surface are small protrusions or feet 14 which engage a supporting surface not shown. Extending substantially normally upwardly relative to the top surface 12 are a pair of toothbrush holders 15 which define a cavity 16 which will receive the handle of a toothbrush (not shown). A pair of disinfectant solution containers 17 are provided which define individual cavities 18. The disinfecting solution is placed in these cavities and the toothbrush bristles are immersed in same for given periods of time to rid them of various bacterial, viral and fungal pathogens.

INDUSTRIAL APPLICABILITY

In order to demonstrate the novelty and efficacy of the present oral hygiene preparations and the kit utilizing same, the following examples are provided below.

Example 1.

To demonstrate the efficacy of the aforementioned toothpaste, the following experiments were performed.

Experiment 1.

In this experiment, 100-150 milligrams of the aforementioned toothpaste composition was suspended in sterile distilled water. The solution was vortexed to make a suspension. This was later transferred to a sterile cup. A tooth was provided and submerged in the toothpaste suspension for a period of three minutes. Following the submersion of the tooth, it was removed and rinsed thoroughly with sterile distilled water. Excess water was removed by shaking the tooth.

Thereafter, the tooth was placed on a blood agar plate that had been inoculated with a lawn, of Staphlycoccus mutans (1.5 X 108 CFU/ml).

Thereafter, the blood agar plate was incubated at a temperature of about 35degrees C. for 24 hours. The plate was then observed with respect to the inhibition of bacterial growth around the tooth. Thereafter, the zone of inhibition was measured in millimeters, and the results were recorded.

Experiment 2.

In this experiment, 100-150 milligrams of toothpaste was placed in sterile distilled water and subsequently vortexed to provide a suspension. This suspension was later transferred to a sterile cup. A tooth was submerged in the toothpaste suspension for three minutes. Thereafter, the tooth was thoroughly rinsed with distilled water and the excess water was removed from the tooth. The tooth was then transferred to a sterile cup which contained the aforementioned mouthwash solution. The tooth was submerged in the mouthwash solution for one minute, and then later removed and excess mouthwash was removed from same. The tooth was then placed on a blood agar plate that had been inoculated with a lawn of S. mutans, and Candida albicans (1.5 x 108 CFU/ml). The blood agar plate was then incubated for a period of 24 hours at temperature of 35 degrees C, and the plate was observed for the inhibition of bacterial growth around the tooth. This zone of inhibition, in millimeters was then measured, and the results recorded.

Experiment 3

In experiment 3, 100-150 milligrams of toothpaste was placed in sterile distilled water and a vortex was applied to same to create a

suspension. This suspension was transferred to a sterile cup. A tooth was later placed in the toothpaste suspension for three minutes. The tooth was removed and sterile water was applied to same. Excess water was removed from the tooth. The tooth was then transferred to the cup and the tooth subsequently submerged in the mouthwash a sterile solution for one minute. The tooth was then removed and rinsed thoroughly with sterile distilled water. The tooth was then placed on a blood agar plate that had been inoculated with a lawn of Candida (1.5 X 10 **8** CFU/ml). This plate was then incubated at 35 degrees C. for 24 hours. The plate was subsequently observed for the inhibition of bacterial growth around the tooth. The estimated zone of inhibition was then measured, in millimeters, and the results were recorded.

In each of the three experiments noted above, inhibition was measured at both 16 hours and at 24 hours. The results revealed that a zone of inhibition was observed around each of the teeth. This zone of inhibition ranged in size from two to five millimeters. These results demonstrate that the toothpaste, and the toothpaste and mouthwash combination provided inhibition against the organisms noted above. These organisms are common pathogens in the oral cavities of humans.

Example 2.

In this example, the efficacy of the disinfecting solution was explored. In this example, inoculums (1.5 *x* 10**8** CFU/ml and 1.5 X 10**4**CFU/ml) of S. mutans ATCC 35668; S. aureus ATCC 25923; and C. albicans were prepared

and vortexed. Each inoculum was poured into separate sterile cups. Thereafter, a patient's toothbrush was placed in each of the inoculums and completely submerged for 10 seconds. Following submersion, the toothbrushes are removed from the inoculums and excess inoculum is removed from each of the brushes. Thereafter, the respective brushes are submerged in the disinfecting solution earlier described, and a timing sequence is initiated. Thereafter, the brushes are removed at 5

minutes,10 minutes, 30 minutes and 60 minute intervals. Each of these brushes is then placed in a 10 millimeter nutrient broth, when testing, for the S. aureus and C. albicans; and 10 millimeters of Todd Hewitt broth, when testing, for the organism S.mutans. The tubes of nutrient, and Todd Hewitt broth and brushes are then vortexed and .01 millimeters of inoculant is removed from the respective suspension and inoculated onto separate blood agar plates. A loop is used to streak the individual blood agar plates for isolation. The blood agar plates are incubated for periods of 24, 48, and 72 hours and subsequent records are made of the colony counts at each of these points in time. It should be understood that the S. mutans plate is incubated in a carbon dioxide environment, and the S. aureus and C. albicans plates are incubated in an oxygen environment. The contaminated brushes are then placed in a 100% denatured ethanol bath after each use for 10 minutes. The brushes are allowed to air dry prior to each use. This procedure is repeated every day for seven days.

For quality control purposes, the following process was followed. Two brushes which had previously been used in the aforementioned procedure were removed from the 100% denatured ethanol and were allowed to air dry. Thereafter, one brush was placed in 10 ml. of nutrient broth and subsequently vortexed. The second brush was then placed in the disinfecting solution for five minutes. After

five minutes, this brush was removed and placed in a 10 ml. nutrient broth and then vortexed. Utilizing a 0.01 ml. Quantitive loop, inoculant is removed from each of these brushes and separate blood agar plates are streaked for isolation with both broth inoculants. These blood agar plates, which are now indicated as being quality control plates, are incubated in oxygen for 24, 48 and 72 hours respectively, and colony counts are recorded at each point in time. These two contaminated brushes are then placed in 100% denatured ethanol after each use for 10 minutes.

The following results were obtained:

Disinfecting solution -
Data sheet (inoculums of 1.5 X 10^8 CFU/ml)

S. aureus ATCC 25923		Date set-up	Colony Counts 24 h	48 h	72 h	Control
Day 1	5 min/10/30	3/05/98	28/25/8	26/21/8	26/21/8	>100
Day 2	"	3/06/98	>100/67/2	>100/67/2	>100/67/2	"
Day 3	"	3/08/98	2/7/0	2/7/0	2/7/0	"
Day 4	"	3/09/98	0/1/0	0/1/0	0/1/0	"
Day 5	5 min/10/1 h	3/11/98	>100/4/0	>100/4/0	>100/4/0	"
Day 6	"	3/12/98	23/6/0	25/6/0	27/6/0	"
Day 7	"	3/13/98	47/11/10	47/11/0	47/12/0	"

S. mutans ATCC 35668		Date set-up	Colony Counts 24 h	48 h	72 h	Control
Day 1	5 min/10/30	3/05/98	>100/20/0	>100/20/0	>100/20/2	>100
Day 2	"	3/06/98	19/47/0	19/47/0	19/47/0	"
Day 3	"	3/08/98	0/0/0	2/0/0	0/0/0	"
Day 4	"	3/11/98	20/44/0	27/64/2	25/59/2	"
Day 5	5 min/10/1 h	3/12/98	79/18/0	85/34/0	85/34/0	"
Day 6	"	3/13/98	42/2/0	54/9/0	54/9/0	"
Day 7	"	3/14/98	>100/7/0	110/6/0	>100/6/0	

C. albicans		Date set-up	Colony Counts 24 h	48 h	72 h	Control
Day 1	5 min/10/30	3/05/98	22/15/0	21/15/0	21/15/1	>100
Day 2	"	3/06/98	38/0/0	38/1/2	38/1/2	>100
Day 3	"	3/08/98	4/1/0	4/3/1	4/3/1	7
Day 4	"	3/09/98	10/10/0	10/10/0	10/15/0	>100
Day 5	5 min/10/1 h	3/11/98	22/5/0	21/5/0	21/5/0	4
Day 6	"	3/12/98	8/28/00	9/28/00	9/28/00	>100
Day 7	"	3/13/98	23/1/0	23/1/0	23/1/0	>100

Quality Control (QC) brush/disinfectant

		Date set-up	Colony Counts 24 h	48 h	72 h
Day 1	5 min	3/05/98	0/0	0/0	0/0
Day 2	"	3/06/98	0/0	0/0	0/0
Day 3	"	3/08/98	0/0	0/0	0/0
Day 4	"	3/09/98	0/0	0/0	0/0
Day 5	5 min/10/1 h	3/11/98	0/0	0/0	0/0
Day 6	"	3/12/98	0/0	0/0	0/0
Day 7	"	3/13/98	0/0	0/0	0/0
Day 8		3/14/98	0/0	0/0	0/0

Disinfecting solution -
Data sheet (inoculums of 1.5 X 10^4 CFU/ml)

S. aureus ATCC 25923		Date set-up	Colony Counts 24 h	48 h	72 h	Control
Day 1	5 min/10/30	3/20/98	0/0/0	0/0/0	0/0/0	>100
Day 2	"	3/21/98	1/0/0	1/0/0	1/0/0	"
Day 3	"	3/22/98	0/0/0	0/0/0	0/0/0	"
Day 4	"	3/23/98	1/0/0	1/0/0	1/0/0	"
Day 5	"	3/24/98	0/0/0	0/0/0	0/0/0	"
Day 6	"	3/25/98	0/0/0	0/0/0	0/0/0	"
Day 7	"	3/27/98	0/0/0	0/0/0	0/0/0	"

S. mutans ATCC 35668		Date set-up	Colony Counts 24 h	48 h	72 h	Control
Day 1	5 min/10/30	3/20/98	0/0/0	0/0/0	0/0/0	>100
Day 2	"	3/21/98	0/0/0	0/0/0	0/0/0	"
Day 3	"	3/22/98	0/0/0	0/0/0	0/0/0	"
Day 4	"	3/23/98	0/0/0	0/0/0	0/0/0	"
Day 5	"	3/24/98	0/0/0	0/0/0	0/0/0	"
Day 6	"	3/25/98	0/0/0	0/0/0	0/0/0	"
Day 7	"	3/27/98	0/0/0	0/0/0	0/0/0	"

C. albicans		Date set-up	Colony Counts 24 h	48 h	72 h	Control
Day 1	5 min/10/30	3/20/98	0/6/2	0/6/2	0/6/02	>100
Day 2	"	3/21/98	13/0/0	13/0/5	13/0/5	"
Day 3	"	3/22/98	1/5/05	1/5/06	1/5/06	"
Day 4	"	3/23/98	22/15/0	23/15/0	23/15/0	"
Day 5	5 min/10/1 h	3/24/98	12/5/02	12/5/02	12/5/02	"
Day 6	"	3/25/98	7/4/00	7/4/00	7/4/00	"
Day 7	"	3/27/98	2/1/01	2/1/01	2/1/01	"

Quality Congrol (QC) brush/disinfectant

		Date set-up	Colony Counts 24 h	48 h	72 h
Day 1	5 min	3/20/98	0/0	0/0	0/0
Day 2	"	3/21/98	0/0	0/0	0/0
Day 3	"	3/22/98	0/0	0/0	0/0
Day 4	"	3/23/98	0/0	0/0	0/0
Day 5	"	3/24/98	0/0	0/0	0/0
Day 6	"	3/25/98	0/0	0/0	0/0
Day 7	"	3/27/98	0/0	0/0	0/0

The above data, as provided, demonstrates conclusively that the disinfecting solution, as described herein, is effective in reducing the number of colony forming units of bacteria which are derived from a toothbrush or other dental appliance, and which may be reintroduced to the patient's oral cavity by way of the same toothbrush or dental appliance.It has been discovered, that in certain medical conditions, the subsequent reintroduction of bacteria into the oral cavity by way of contaminated dental appliances, or a toothbrush, can exasperate or further prolong the duration of an illness or disorder. The present kit, which includes this disinfecting solution, provides an effective means whereby this bacterial reintroduction can be substantially eliminated.

Example 3.

In this example, the efficacy of the mouthwash which is employed with the present invention is demonstrated.

Methods

Three mouthwash test preparations were evaluated for antimicrobial properties against Candida albicans and Streptococcus mutans. Cell suspensions of each organism were exposed to three mouthwash preparations, separately, over multiple timepoints;plated on blood agar (BAP); incubated at 35degrees C.; and colony counts recorded at 24 and 48 hours respectively. The mouthwash test preparations contain: cetyl pyridium chloride (CPC), without flavorina components, at a 1X strength made from a 50X cetyl pyridium chloride stock (CPC); A1 blue, and A2 green were provided at the working concentration.

50uL of CPC, Al blue, and A2 green were plated separately, as controls, to detect possible contamination of the respective mouthwash preparations. McFarland cell suspensions of C. albicans and S. mutans (ATCC 35668) were made in tryptone yeast extract broth (Sensibroth) yielding, approximate cell densities of 1.5X 10^8 cells/mL. 50 uL of each organism were plated as a growth control.

Cell suspensions of both organisms were tested against the three mouthwash solutions as follows: a 1:100 mixture of cells in mouthwash was made at time zero, and 50 uL was removed immediately, and plated on a BAP. Subsequent aliquots were collected at 10 seconds, 30 seconds, 1 minute, 5 minutes, and 10 minute timepoints and plated on BAP. C albicans plates were incubated in oxygen at 35 degrees Centigrade. S. mutans plates were incubated in carbon dioxide at 35degrees Centigrade.

Results

CPC, Al blue, and A2 green control plates showed no contamination of the mouthwash solutions prior to testing (Table 1). Growth controls of cell suspensions demonstrated recovery of viable organisms prior to exposure to mouthwash (Table 1).

1X CPC mouthwash was shown to effectively kill both S. mutans and C. albicans at as little as 10 seconds of exposure (Table 2). After 24 hours of incubation, no growth was seen on plates inoculated with Al blue-treated S. mutans. However, at 48 hours, 25 colonies appeared on the 10 second plate and no growth was observed at other timepoints (Table 3). Al blue decreased C.

albicans growth by 3 to 4 fold, but total killing of the organism was not achieved even at 10 minutes of exposure (Table 3).

No growth was seen on plates inocuated with green-treatedS. mutans after 24 hours of incubation, however at 48 hours, greater than 100 colonies were present at all timepoints (Table 4). As with the Al blue experiment, A2 green did not achieve total killing of C. albicans even after 10 minutes but growth inhibition was apparent by 3 to 4 fold (Table 4).

It was seen that CPC effectively killed both S. mutans and C.albicans even after a brief 10 second exposure. Al blue was inhibitory to the growth of both organisms, however, it did not achieve total killing of C. albicans but was more effective against S. mutans. A2 green inhibited growth of both organisms but did not achieve total killing. A2 green demonstrated significantly better inhibition of S. mutans than Al blue while both mouthwash preparations were comparable inhibitors of C. albicans.

Table 1. Control Plates

Inoculum	24 hours	48 hours
CPC[1]	no growth	no growth
Al Blue[1]	no growth	no growth
A2 Green[1]	no growth	no growth
Candida albicans[2]	>1000 colonies	same as 24 hours
Streptococcus mutans[2]	>1000 colonies	same as 24 hours

1. 50uL of each pre-inoculation test solution was plated.
2. Approximately 7.5 X 10^6 CFUs of C albicans and S. mutans were plated as growth controls.

Table 2. Antimicrobial effectiveness of CPC (Cetyl Pyridinium Chloride)

Timepoint	Candida albicans[1]		Streptococcus mutans[2]	
	colonies in 24 hrs	colonies in 48 hrs	colonies in 24 hrs	colonies in 48 hrs
10 sec	none	none	none	none
30 sec	none	none	none	none
I min	none	none	none	none
5 min	none	none	none	none
10 min	none	none	none	none

1. approximately 7.5 X 10^4 CFUs of C. albicans in CPC plated on BAP at timepoints indicated.

2. Approximately 7.5 X 10^4 CFUs of S. mutans in CPC plated on BAP at timepoints indicated.

Table 3. Antimicrobial effectiveness of Al Blue

Timepoint	Candida albicans[1]		Streptococcus mutans[2]	
	colonies in 24 hrs	colonies in 48hrs	colonies in 24 hrs	colonies in 48 hrs
10 sec	19	21	none	25

30 sec	14	14	none	none
1 min	08	08	none	none
5 min	30-35	34	none	none
10 min	10	11	none	none

1. Approximately 7.5 X 10^4 CFUs of C. albicans in Al blue plated on BAP at timepoints indicated.

2. Approximately 7.5 X 10^4 CFUs of S. mutans in Al blue plated on BAP at timepoints indicated.

Table 4. Antimicrobial effectiveness of A2 Green

Timepoint	Candida albicans[1]		Streptococcus mutans[2]	
	colonies in 24 hrs	colonies in 48 hrs	colonies in 24 hrs	colonies in 48 hrs
10 sec	04	04	none	>100
30 sec	24	30	none	>100
1 min	20	18	none	>100
5 min	17	18	none	>100
10 min	36	37	none	>100

1. approximately 7.5 X 10^4 CFUs of C. albicans in A2 green plated on BAP at timepoints indicated.

2. Approximately 7.5 X 10^4 CFUs of S. mutans in A2 green plated on

BAP at timepoints indicated.

Example 4.

In order to determine the relative toxicity or irritancy levels of various toothpastes and mouthwashes, a red blood cell heamolysis assay was employed to obtain information on the effects of these substances on cell membrane integrity.

The Red Blood Cell assay provides a simple test system that uses easily obtainable cells and is characterized by defined and objective endpoints. The assay is rapid, inexpensive, and does not require any specialized equipment. Haemoglobin release is a useful endpoint of cell membrane integrity. It is therefore highly suitable as a screening assay in a first-order *in vitro* test battery for the assessment of potential toxicity to tissue, including tissues of the oral cavity.

1. EXPERIMENTAL DESIGN

1.1. Objectives

To assess the membranolytic activity of test materials. The test materials are incubated with isolated red blood cells. The degree of damage to the red blood cell membrane is quantified by spectro-photometric measurement of released haemoglobin.

Summary of Test Method

Red blood cells are isolated concentrations of the test materials defined from results of a range finding study; released haemoglobin is measured at 541 run and the concentration resulting in 50% haemolysis (relative to a totally lysed sample) calculated.

2. TEST PROCEDURE

2.1. Preparation of red blood cells

(a) Blood is collected (with a suitable anticoagulant) and diluted (4 vol; 10 vol) with PBS (see Appendix 2 for preparation of buffers). The solution is centrifuged at I1500 x g at room temperature for 10 minutes and the supernatant and "buffy" layer of write blood cells carefully removed with a pasteur pipette. The packed red blood cells are suspended ended in PBS to a total volume of 10 ml and centrifuged as before. The whole process is repeated again so that a total of three 'washes" is made in all.

(b) After the final centrifugation, the packed cell volume is diluted with phosphate buffered saline (PBS) - Appendix 2) to give an approximate 2% erythrocyte suspension. However, for a packed volume of e.g. 2 ml, where the required volume of PBS added would be 98 ml, add 80 ml at this stage. The exact volume of PBS required for a 2% suspension is calculated from the optical density and adjusted accordingly.

(c) To determine the optical density, a 1 ml sample of the erythrocyte suspension (prepared above) is diluted to 10 ml in distilled or deionised water (when using distilled water the pH should be in the range 6.5-7.5). The desired optical density (OD) of the lysate is equivalent to 0.5 (± 5%) at 541 run in 1 cm path length cells. Distilled or deionised water is used as the blank sample. The desired volume of PBS required for the correct concentration of erythrocytes in suspension to give the normal desired extinction of 0.5 (± 5%) is calculated using the following equation:

$$\frac{0.6 \text{ (optical density)} \times 80}{0.5} = 96 \text{ ml PBS}$$

Example:

2 ml (packed cell volume) + 80 ml PBS

$$\frac{\text{Observed OD} \times \text{original volume of PBS}}{\text{Desired OD}} = \text{Desired vol. PBS}$$

i.e. add 16 ml of PBS to the original 80 ml to give the desired total volume of suspension.

(d)The prepared suspension can be stored at 4° C for up to 5 days; if before the end of this period any visual signs of haemolysis are detected, then the sample should be discarded.

Red Blood Cell Haemolysis Test

Rangefinding Study: Test materials are dissolved in PBS or vehicle (Section 3) at the following fixed final assay concentrations in mg/l (w/v):

1.0

10.0

100.0

1,000.0

10,000.0

100,000.0

(a) 1 vol of erythrocyte suspension is added to 3 vols of the test material in PBS or vehicle to give the final concentrations shown above; a single sample is used for

each concentration to be tested. Assay mixtures are incubated for 60 minutes at room temperature with agitation.

(b) After the incubation period, the samples are centrifuged at approximately 10,000 gav/min and the degree of haemolysis determined spectrophotometrically at 541 mn. Results are compared to a sample totally lysed with distilled or deionised water.

Main Haemolysis Study

A minimum of 2k concentrations adequately spaced within the concentration range derived from the rangefinding study, will be assessed to give an accurate indication of the concentration resulting in 50% haemolysis (H_{50}) by a standard method (calculation from graphical plots of percentage haemolysis versus concentration).

Selection of test concentrations:

As a result of the rangefinding study, a provisional concentration range for haemolytic effect can be identified. Initial main study concentrations are selected to span both the concentrations of maximum and minimum effect. A geometric progression of selected concentrations is recommended.

Haemolysis test:

(a) Samples are prepared in triplicate at final concentrations selected from the rangefinding study as above. Assay mixtures are incubated (3 vols sample with 1 vol erythrocyte suspension) for 60 minutes at room temperature with agitation.

(b) After the incubation period, the samples are centrifuged at approximately 10,000 gav/min and the degree of haemolysis determined in the supernatant at 541 nm.

(c) For each assay, results are expressed relative to a sample totally lysed with distilled or deionised water. A fragility control value will be determined (cells with PBS alone) and deducted from each extiction value obtained. Fragility control values should not normally exceed 5% of the totally lysed sample.

(d) Spectrophotometer blanking; vehicle containing 10% of each test material (or saturated solution) will be compared to the extinction of vehicle alone. If there is no significant difference (OD increase of less than 0.01 units) then vehicle will be used as the assay blank. If the test material causes a change in extinction, then relevant test material blanks will be employed at each concentration tested.

(e) Positive control samples should be incorporated for each blood preparation. Sodium dodecyl sulphate (SDS) of high purity (>99%) specification should be used;

recommended final assay concentrations are 10 and 100 mg/l.

If the lowest rangefinding concentration tested (1.0 mg/l) produces a significant haemolysis and this can be confirmed in triplicate, then in this case the H_{50} value will be defined as equal to or less than 1.0 mg/l.

If the highest rangefinding concentration tested (100,000 mg/1) fails to produce haemolysis and this can be confirmed in triplicate, then in this case the H_{50} value will be defined as equal to or greater than 100,000 mg/l.

Results

The following results were demonstrated with the above described aassy:

Toothpaste:

Test Material	% Haemolysis
Phosphate Buffered Saline	0.00
TP-1	1.34
Crest® Tartar Protection	96.56
Colgate® Total	84.99
Peroxicare®	91.88
Crest® Multicare	92.61

Mouthwash:

Test Material	% Haemolysis
Phosphate Buffered Saline	0.00
Scope®	134.79
ACT ®	83.80
MW-1	5.05

Individual Components:

Test Materials	% Haemolysis
Phosphate Buffered Saline	0.00
25% Sodium Fluoride	3.31
0.05% CPC	92.36
0.10% DHA	3.24

The above results demonstrate that the compositions of the present invention, TP-1 and MW-1 cause significantly less haemolysis than other brands of toothpastes and mouthwashes, respectively. Consequently, these compositions will cause less toxicity and irritancy to oral tissues.

Therefore, it will be seen that the oral hygiene preparations, associated method, and kit for utilizing same, provides a fully dependable and practical means by which an individual can, with less toxicity or irritancy, reduce the numbers of microflora in their oral cavity and which contribute to the development of maladies such as caries, and other oral disorders. The present invention further substantially inhibits the development of other diseases which may find their path of introduction into the patient by way of contaminated oral appliances such as toothbrushes, dentures, and various orthodontic appliances as well as by contaminated toothbrushes.

The oral hygiene preparations and kit for utilizing same of the present invention further eliminates many of the deficiencies attendant with the prior art practices by providing a simple, easy kit which can be readily utilized by an individual without substantial instruction. The present oral hygiene preparations are effective, safe, pleasant tasting, and highly effective in reducing the incidence of various oral diseases. The invention has been described in language more or less specific as to structural and methodical features. It is to be understood, however, that the invention is not limited to the specific features shown and described, since the means herein disclosed comprise preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims appropriately interpreted in accordance with the doctrine of equivalents.

CLAIMS:

1. An oral hygiene method for reducing the incidence of caries in a patient, comprising: contacting the patient's teeth, and surrounding oral cavity with a toothpaste, and mouthwash compositions comprising a therapeutically effective amount of Cetyl Pyridinium Chloride; and exposing the patient's dental appliances and toothbrush periodically to a disinfecting solution comprising a therapeutically effective amount of Cetyl Pyridinium Chloride.

2. An oral hygiene method as claimed in claim 1, wherein the therapeutically effective amount of Cetyl Pyridinium Chloride in the toothpaste is less than about 0.37% by weight of the resulting toothpaste composition.

3. An oral hygiene method as claimed in claim 2, wherein the therapeutically effective amount of the Cetyl Pyridinium Chloride in the mouthwash is less than about 0.40% by weight of the resulting mouthwash composition.

4. An oral hygiene method as claimed in claim 3, wherein the therapeutically effective amount of the Cetyl Pyridinium Chloride in the disinfecting solution is less than about 0.075%, by weicyht, of the resulting disinfecting solution.

5. An oral hygiene method as claimed in claim 1, wherein the toothpaste, mouthwash and disinfecting solution further comprises a therapeutically effective amount of Sodium Lauryl Sarcosine.

6. An oral hygiene method as claimed in claim 5, wherein the therapeutically effective amount of Sodium Lauryl Sarcosine in the toothpaste is less than about 2.6%, by weight, of the resulting toothpaste- composition.

7. An oral hygiene method as claimed in claim 6, wherein the therapeutically. effective amount of Sodium Lauryl Sarcosine in the mouthwash is less than about 0.4%, by weight, of the resulting mouthwash composition.

8. An oral hygiene method as claimed in claim 7, wherein the therapeutically effective amount of Sodium Lauryl Sarcosine in the disinfecting solution is less than about 2.1%, by weight, of the resulting disinfecting solution.

9. An oral hygiene method as claimed in claim 1, wherein the toothpaste comprises:

about 1.6% to about 2.6% by weight of Sodium Lauryl Sarcosine;
about 0.25% to about 0.30% by weight of Sodium Fluoride;
about 0.1% to about 0.6% by weight of Dehydroacetic Acid;
about 0.18% to about 0.37% by weight of Cetyl Pyridinium Chloride;
about 30% to about 60% by weight of Sorbitol;
about 3% to about 10% by weight of Glycerine;
about 1% to about 3% by weight of Cellulose Gum;
about 0.3% to about 1.0% by weight of Titanium Dioxide;
about 0.08% to about 0.1% by weight of Flavors;
about 10% to about 30% by weight of Hydrated Silica; and
about 10% to about 30% by weight of water.

10. An oral hygiene method as claimed in claim 1, wherein the mouthwash comprises:

about 0.15% to about 0.4%, by weight, of Sodium Lauryl Sarcosine;

about 0.25% to about 0.30%, by weight of Sodium Fluoride;

about 0.01% to about 0.06%, by weight of Dehydroacetic Acid;

about 0.05% to about 0.10%, by weight of Cetyl Pyridinium Chloride;

about 5% to about 10% by weight of Sorbitol;

about 10% to about 20% by weight of Glycerine;

about 0.01% to about 0.1%, by weight, of Menthol;

about 0.01% to about 0.1%, by weight, of citric acid;

about 0.10% to about 1.0% by weight of Polysorbate;

about 0.08% to about 0.1% by weight of Potassium Tribasic Phosphate;

about 0.01 to about 0.10%, by weight, of Potassium Benzoate;

about 0.1% to about 0.7% by weight of Peppermint oils; and

about 70% to about 80% by weight of water.

11. An oral hygiene method as claimed in claim 1, wherein the disinfecting solution comprises:

about 0.06% to about 0.75% by weight of Cetyl Pyridinium Chloride;

about 1% to about 2% by weight of Sodium Lauryl Sarcosine;

about 0.01% to about 0.8% by weight of Sodium Carbonate;

about 14% to about 35% by weight of ethanol;

about 0.01% to about 0.075% by weight of EDTA; and

about 65% to about 87% by weight of water.

12. An oral hygiene method as claimed in claim 1, wherein the toothpaste, mouthwash and disinfecting solution each have a pH of about 6.2.

13. An oral hygiene method as claimed in claim 1, wherein the therapeutically effective amount of Cetyl Pyridinium Chloride in the toothpaste, mouthwash and disinfecting solution effectively reduces the number of bacterial flora which contribute to the development of caries.

14. An oral hygiene method as claimed in claim 1, wherein the patient's dental appliances and tooth brush are exposed to the disinfecting solution after being exposed to the oral cavity of the patient.

An oral hygiene kit, comprising:

a toothpaste for use in combination with a tooth brush;

a mouthwash; and a disinfecting solution to disinfect the toothbrush,

and wherein the toothpaste, mouthwash and disinfecting solution each comprise a therapeutically effective amount of Cetyl Pyridinium Chloride and Sodium Lauryl Sarcosine to reduce the incidence of caries in a patient.

16. An oral hygiene kit as claimed in claim 15, wherein the therapeutically effective amount of Cetyl Pyridinium Chloride and the Sodium Lauryl Sarcosine in the toothpaste, mouthwash and disinfecting solution effectively reduces the number of bacterial flora which contribute to the development of caries.

17.An oral- hygiene kit as claimed in claim 15, wherein the toothpaste, mouthwash and disinfecting solution each have a pH of about 6.2.

18. An oral hygiene kit as claimed in claim 15, wherein the toothpaste comprises:

about 1.6% to about 2.6%, by weight, of Sodium Lauryl Sarcosine;

about 0.25% to about 0.30%, by weight, of Sodium Fluoride;

about 0.1 to about 0.6%, by weight, of Dehydroacetic Acid;

about 0.18% to about 0.37%, by weight, of Cetyl Pyridinium Chloride;

about 30% to about 60%, by weight, of Sorbitol;

about 3% to about 10%, by weight, of Glycerine;

about 1% to about 3%, by weight, of Cellulose Gum;

about 0.3% to about 1.0%, by weight, of Titanium Dioxide;

about 0.08% to about 0.1%, by weight, of Flavors;

about 10% to about 30%, by weight, of Hydrated Silica; and

about 10% to about 30%, by weight, of water.

19. An oral hygiene kit as claimed in claim 15, wherein the mouthwash comprises:

about 0.15% to about 0.4%, by weight, of Sodium Lauryl Sarcosine;

about 0.25% to about 0.30%, by weight, of Sodium Fluoride;

about 0.01% to about 0.06%, by weight, of Dehydroacetic Acid;

about 0.05% to about 0.10%, by weight, of Cetyl Pyridinium Chloride;

about 5% to about 10%, by weight, of Sorbitol;

about 10% to about 20%, by, weight, of Glycerine;

about 0.01% to about 0.1%, by weight, of Menthol;

about 0.01% to about 0.1%, by weight, of Citric Acid;

about 0.1% to about 1.0%, by weight, of Polysorbate;

about 0.08% to about 0.10%, by weight, of Potassium Tribasic Phosphate;

about 0.01 to about 0.10%, by weight, of Potassium Benzoate;

about 0.1% to about 0.7%, by weight, of Peppermint oil; and

about 70% to about 80%, by weight, of water.

20. An oral hygiene kit as claimed in claim 15, wherein the disinfecting solution comprises:

about 0.06% to about 0.75%, by weight, of Cetyl Pyridinium Chloride;

about 1% to about 2%, by weiaht, of Sodium Lauryl Sarcosine;

about 0.01% to about 0.8%, by weight, of Sodium Carbonate;

about 14% to about 35%, by weight, of ethanol;

about 0.01% to about 0.075%, by weight, of EDTA; and

about 65% to about 87%, by weight, of water.

21. An oral hygiene kit, comprising:

toothpaste comprising less than about 0.37%, by weight, of Cetyl Pyridinium Chloride, and less than about 2.6%, by weight, of Sodium Lauryl Sarcosine; a mouthwash comprising less than about 0.4%, by weight, of Cetyl Pyridinium Chloride and less than about 0.4%, by weight, of Sodium Lauryl Sarcosine; and a disinfecting solution comprising less than about 0.075%, by weight, of Cetyl Pyridinium Chloride, and less than about 2.1 % by weight of Sodium Lauryl Sarcosine.

22. A toothpaste comprised of about 1.7% by weight of Sodium Lauryl Sarcosine; about 0.25% by weight of Sodium Fluoride; about 0.2% by weight of Dehyroacetic Acid; about 0.30% by Glycerine, at a pH of 6.2.

23. A mouthwash comprised of about 0.2.% by weight of Sodium Lauryl Sarcosine: about 0.25% by weight of Sodium Fluoride; about 0.1% by weight of Dyhydroacetic Acid; about 0.05% by weight of Cetyl Pyridium Chloride; at pH 6.2.

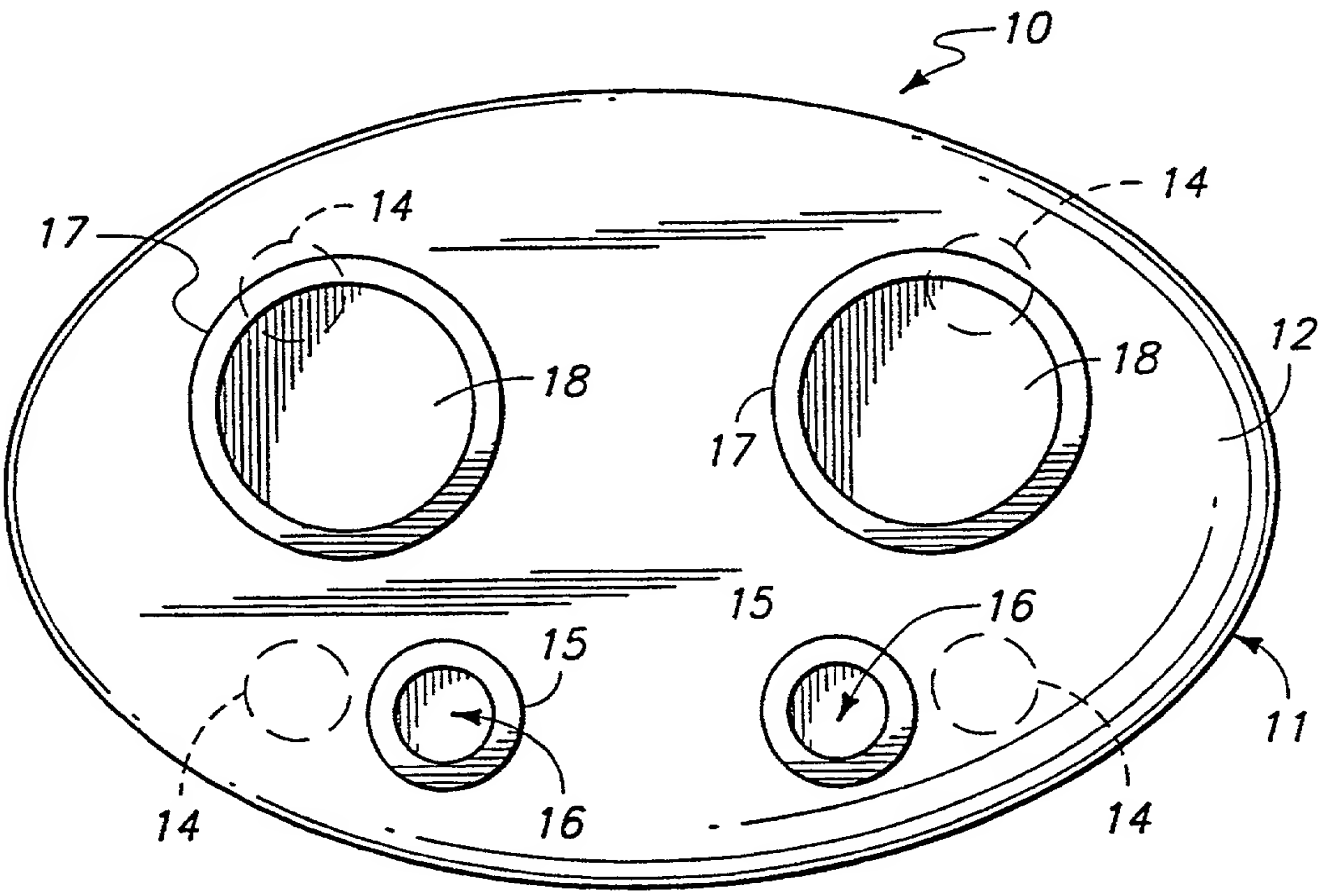


Fig. 1

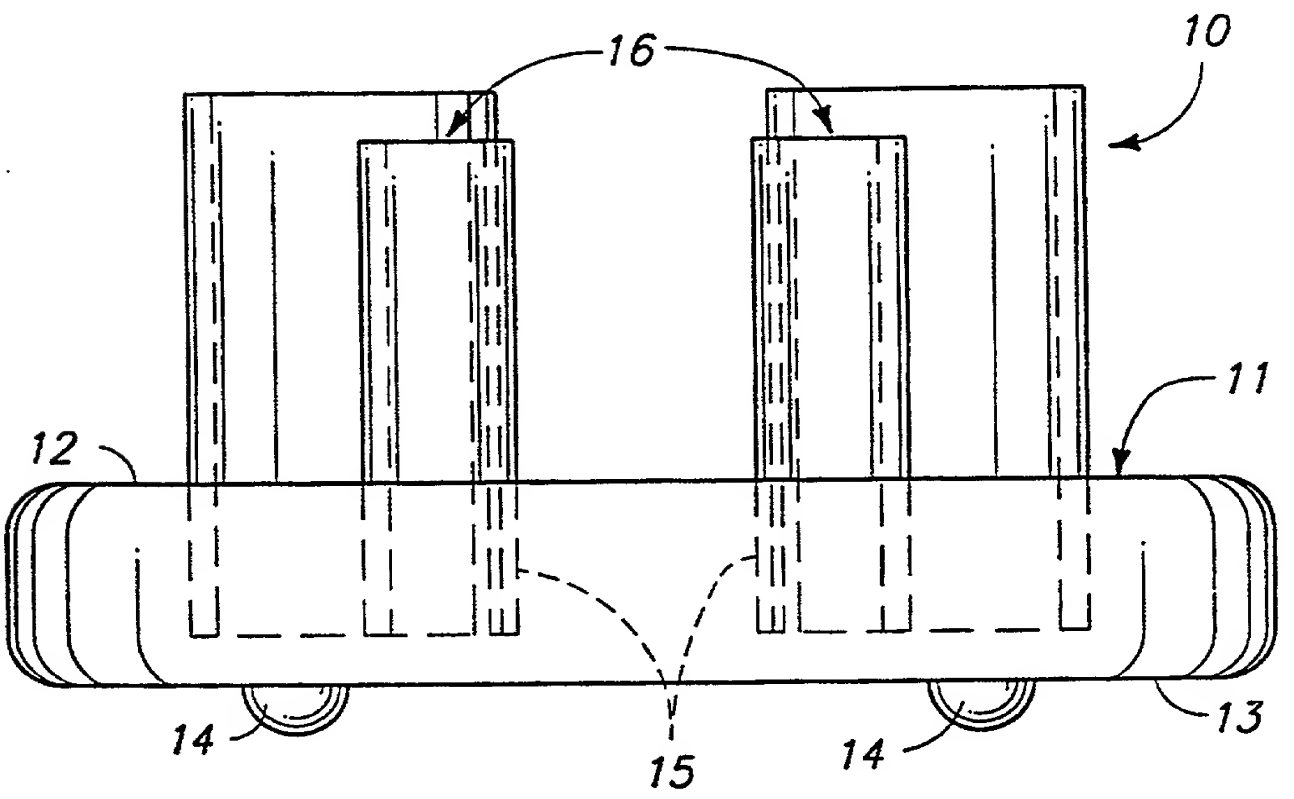
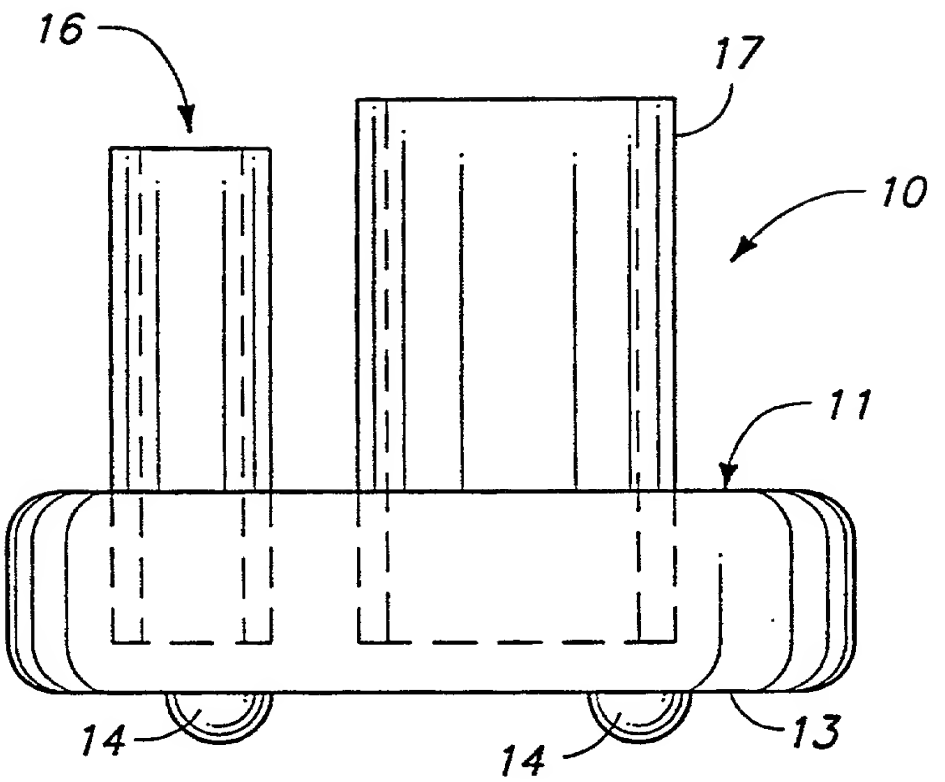


Fig. 2



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PTO/SB/01 (10-00)
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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☐ Declaration Submitted with Initial Filing OR ☒ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	CA-33-02-US
First Named Inventor	Victor Carnell
COMPLETE IF KNOWN	
Application Number	09/890,135
Filing Date	July 26, 2001
Group Art Unit	
Examiner Name	

As a below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

ORAL HYGIENE PREPARATIONS: ASSOCIATED METHODS AND KIT

(Title of the Invention)

the specification of which

☐ is attached hereto

OR

☒ was filed on (MM/DD/YYYY) January 26, 2000 as United States Application Number or PCT International Application Number PCT/US00/01952 (if applicable). and was amended on (MM/DD/YYYY)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
09/239,051	US	01/27/1999	☐	☐	☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)

☐ Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

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DECLARATION — Utility or Design Patent Application

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR : ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any]) Victor	Family Name or Surname Carnell
Inventor's Signature Victor Carnell	Date 10-24-01

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NAME OF SECOND INVENTOR: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])		Family Name or Surname	
Inventor's Signature			Date
Residence: City	State	Country	Citizenship
Mailing Address			
Mailing Address			
City	State	ZIP	Country

☐ Additional inventors are being named on the ____supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.

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POWER OF ATTORNEY OR AUTHORIZATION OF AGENT

Application Number	09/890,135
Filing Date	July 26, 2001
First Named Inventor	Victor Carnell
Group Art Unit	
Examiner Name	
Attorney Docket Number	CA-33-002-US

I hereby appoint:

☐ Practitioners at Customer Number _____ → *Place Customer Number Bar Code Label here*

OR

☒ Practitioner(s) named below:

Name	Registration Number
Kevin S. Lemack	32,579
Henry C. Nields	17,029

as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

Please change the correspondence address for the above-identified application to:

☐ The above-mentioned Customer Number.

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I am the:

☒ Applicant/Inventor.

☐ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

SIGNATURE of Applicant or Assignee of Record

Name	Victor Carnell
Signature	Victor Carnell
Date	10-24-01

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.